Some Aoridae (Amphipoda: Gammaridea) Collected by the Hancock Expeditions to the Eastern Pacific, 1931–1941[1]

A. A. Myers[2]

ABSTRACT: New records for the Pacific are given for three species of *Microdeutopus* Costa, one species of *Acuminodeutopus* Barnard, one species of *Amphideutopus* Barnard, and one species of *Neomegamphopus* Shoemaker. Full descriptions are given of *Microdeutopus hancocki* sp. nov. and *Microdeutopus trichopus* sp. nov.

The parameters of the various families of "domicolous" Amphipoda have recently become particularly difficult to define owing to the discovery of numerous intermediate forms (Barnard, 1959, 1961*b*, 1962, 1964). The Aoridae can be described most conveniently as species of the aorid-photid-corophiid complex which have the male first peraeopod (=gnathopod) more markedly developed than the second, the urosome laterally compressed, and the third uropod with two, more or less subequal rami. The present paper deals with those genera of the family Aoridae in the Hancock collections in which the first male peraeopod has the carpopodite more bulky than the propopodite, with teeth on its posterior margin.

I am indebted to Dr. J. L. Barnard and the United States National Museum for making the material available to me, to Dr. E. Naylor for helpful discussion, and to the Natural Environment Research Council for financial support.

Microdeutopus schmitti Shoemaker

Shoemaker, 1942. Smithson. Misc. Coll. 101 (11):18–21, fig. 6
Fig. 1*a, d, j, l*

identification: Specimens agree well with the original description (Shoemaker, 1942). Figures of the paragnaths, ventral peraeon spines, and first and second peraeopoda are given for comparison with *M. hancocki* sp. nov.

distribution: Present material came from Costa Rica, and was particularly abundant in the numerous samples from Salinas Bay. Formerly the species was recorded from Baja California and California, apparently reaching its most northerly point of distribution at Cayucos (Barnard, personal communication).

Microdeutopus hancocki sp. nov.

Figs. 1*b, c, e–i, k,* and 6*a*

identification: Among *M. schmitti* from Salinas Bay, Costa Rica, occur a few male *Microdeutopus* which differ constantly from the *M. schmitti* males in a number of characters. Unlike *M. schmitti* (Fig. 1*d*) the first peraeopod (Fig. 1*b, c*) has the basipodite greatly swollen antero-proximally, the carpopodite has a dentiform process on its anterior margin, and the propopodite has a single lobe on its posterior margin (cf. Fig. 1*d*). In addition, the meropodite bears very long setae which are three to four times the length of those of *M. schmitti*. The second peraeopod has the carpopodite and propopodite approximately subequal in width at their junction and the propopodite is short (Fig. 1*h*), whereas in *M. schmitti* the carpopodite is distinctly broader than the propopodite at their junction and the propopodite is relatively long (Fig. 1*j*). Also, the spine on the ventral surface of the sixth peraeon segment differs in the two types of male: that of *M. schmitti* (Fig. 1*l*) is well developed, though shorter than those of peraeon segments 3–5, while in present material (Fig. 1*k*) it is minute. Finally, the mandibular processes of the paragnath are considerably longer in present material (Fig. 1*f*) than in *M. schmitti* (Fig. 1*a*).

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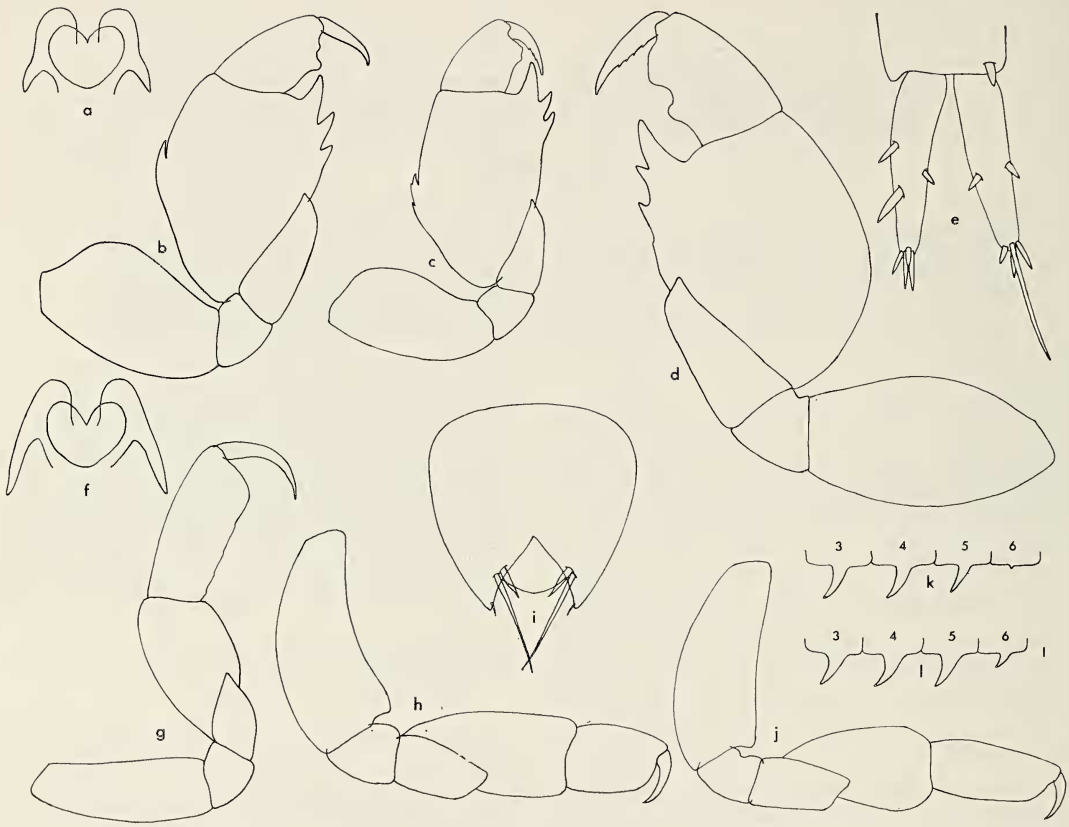

FIG. 1. *Microdeutopus schmitti* Shoemaker. SALINAS BAY, COSTA RICA. ♂: *a,* paragnaths; *d,* peraeopod 1; *j,* peraeopod 2; 1, ventral surface of peraeon segments 3–6.
Microdeutopus hancocki sp. nov. SALINAS BAY, COSTA RICA. ♂ Holotype: *b,* peraeopod 1. ♂ Paratype: *e,* uropod 3; *f,* paragnaths; *h,* peraeopod 2; *i,* telson; *k,* ventral surface of peraeon segments 3–6. BAHIA HONDA, PANAMA. ♀ Paratype: *g,* peraeopod 1. SALANGO ISLAND, ECUADOR. ♂: *c,* peraeopod 1.

In view of the magnitude of these characters, which always occur in combination, present material is designated as a new species, for which *Microdeutopus hancocki* sp. nov. is proposed. This is further justified since the form often occurs together with *M. schmitti* in the same sample in the type locality at Salinas Bay. In samples from Ecuador, Panama, and Galapagos, *M. hancocki* occurs alone, and specimens from the first two of these localities agree with the type material. Specimens from Galapagos are smaller and more delicate than the types, with the antennules and antennae relatively longer (about half the body length), and the basipodite of the first peraeopod not greatly expanded antero-proximally. In other respects, however, they agree with type specimens, and are here considered as a variant of *M. hancocki.*

Females which occur with male *M. hancocki* in Panama and Galapagos samples resemble female *M. schmitti,* but differ from the latter in having the carpopodite of the first peraeopod smoothly rounded and lacking a tooth on the posterior distal angle. In *M. schmitti* females, one or more carpal teeth develop at an early age and are clearly discernible in specimens of 3.0 mm body length, whereas, in Panama specimens considered to be *M. hancocki,* no tooth is present, even in females 4.0 mm long. Similar females occur among *M. schmitti* females from Salinas Bay, and it is assumed that these are also the females of *M. hancocki* sp. nov. For practical purposes, since separation of *M. hancocki*

females from those of *M. schmitti* depends upon this negative character, female paratype material has been designated from the Panama collections in which *M. schmitti* has not been recorded. These can definitely be assumed to be females of the *M. hancocki* males which they accompany.

M. hancocki appears to tolerate a narrower range of ecological conditions than does *M. schmitti,* all the specimens of the former being obtained from sand, while the latter was collected from mud, sand, algae, shells, and coral. *M. hancocki* is apparently a shallow water form, occurring at 1½–10 fathoms; *M. schmitti* ranges slightly deeper than this, to 15 fathoms in present samples, and to 23 fathoms (J. S. Garth, personal communication).

Formal Description

TYPE LOCALITY: Salinas Bay, Costa Rica.

MALE HOLOTYPE: *Head* (Fig. 6*a*) lobes moderately produced, obtuse; eyes circular; paragnath (Fig. 1*f*) with the mandibular processes long and slender. Body length, from anterior margin of cephalosome to tip of telson, 3.7 mm (paratypes 3.2–3.8 mm); peraeon segments (Fig. 1*k*) 3–5 each with a short, robust, anteriorly curved spine on its ventral surface, 6 with a minute spine. *Antennules* slightly more than ⅓ the body length, the first and second peduncular segments subequal, the third segment about ⅓ the length of the second; flagellum 8-segmented (paratypes 8- or 9-

TABLE 1
STATION DATA

STATION	DATE	LOCALITY	BEARINGS		REMARKS
113–33	9 Mar 1933	Bahia Honda, Panama	7°45′18″N	81°32′51″W	5–8 fa; sand
114–33	10 Mar 1933	Bahia Honda, Panama	7°43′46″N	81°31′54″W	shallow water; coral
116–33	13 Mar 1933	Cocos Bay, south of Port Cuelebra, Costa Rica	10°33′35″N	85°42′30″W	2 fa; sand, shell
125–33	19 Mar 1933	Isabel Island, Mexico	21°51′30″N	105°53′35″W	shallow water; Porites coral
185–34	25 Jan 1934	Off Cartago Bay, Isabela (Albemarle), Galapagos	0°34′57″S	90°53′44″W	32 fa; mud
187–34	25 Jan 1934	Cartago Bay, Isabela (Albemarle) I., Galapagos	0°36′18″S	90°57′11″W	8–10 fa; sand with rock patches
190–34	26 Jan 1934	East of south end of Isabela (Albermarle) I., Galapagos	0°55′ S	90°30′ W	58–60 fa; sand, nullipores
204–34	31 Jan 1934	Gardner Bay, Espanola (Hood) I., Galapagos	1°20′40″S	89°39′15″W	30 fa; sand
257–34	25 Feb 1934	Off South Viradores Is., Port Cuelebra, Costa Rica	10°35′ N	85°43′15″W	10 fa; sand, shells
398–35	18 Jan 1935	Salango I., Ecuador	1°35′15″S	80°52′52″W	3 fa; sand
460–35	8 Feb 1935	Playa Blanca, Costa Rica	10°56′ N	85°52′50″W	3–5 fa; sand, shells
461–35	8 Feb 1935	Playa Blanca, Costa Rica	10°56′45″N	85°53′50″W	15 fa; mud, sand, algae
475–35	11 Feb 1935	Salinas Bay, Costa Rica	11°04′25″N	85°44′40″W	20 fa; mud
476–35	11 Feb 1935	Salinas Bay, Costa Rica	11°03′33″N	85°43′47″W	8 fa; mud
477–35	11 Feb 1935	Salinas Bay, Costa Rica	11°03′20″N	85°43′30″W	2 fa; coarse sand
478–35	11 Feb 1935	Salinas Bay, Costa Rica	11°03′13″N	85°43′20″W	1½ fa; coarse sand
479–35	11 Feb 1935	Salinas Bay, Costa Rica	11°02′50″N	85°44′10″W	2 fa; sand
480–35	11 Feb 1935	Salinas Bay, Costa Rica	11°04′10″N	85°44′40″W	12 fa; shells, vegetation
481–35	11 Feb 1935	Salinas Bay, Costa Rica	11°03′33″N	85°44′05″W	6 fa; shells, vegetation
564–36	10 Mar 1936	Off south end of Tiburon I., Gulf of California	28°44′45″N	112°18′20″W	8–10 fa; kelp, coralline

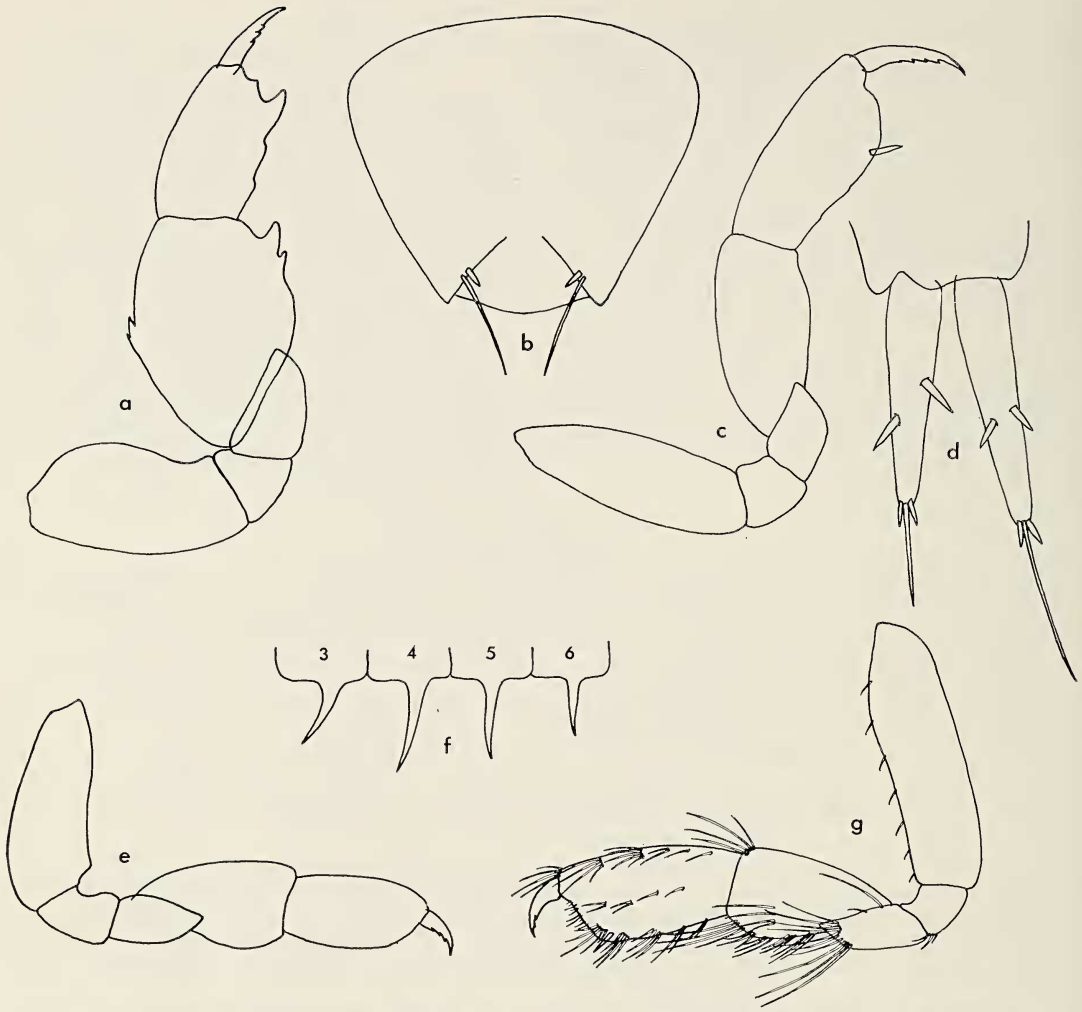

FIG. 2. *Microdeutopus trichopus* sp. nov. ISABELA ISLAND, GALAPAGOS. ♂ Holotype: *a,* peraeopod 1; *b,* telson; *d,* uropod 3. ♂ Paratype: *e,* peraeopod 2; *f,* ventral surface of peraeon segments 3–6. ♀ Paratype: *c,* peraeopod 1; *g,* peraeopod 2.

segmented) about equal to the peduncle; accessory flagellum 2-segmented (some paratypes 3-segmented), the first segment elongate, the second rudimentary, not extending beyond the first segment of the primary flagellum. (In a few paratypes it reaches the second segment, when the meristematic basal segment of the primary flagellum is dividing.) *Antennae* shorter than the antennules, the fourth and fifth peduncular segments subequal; flagellum 4-segmented, the first segment long, equal to the combined lengths of the terminal three. *Peraeopod* 1 (Figs. 1*b, c*) with the coxopodite produced anteriorly, rounded; basipodite markedly produced anteroproximally; meropodite with very long setae on the posterior border. Carpopodite oval, longer than broad, with a median dentiform process on its anterior margin, and, at the posterior distal angle, three stout teeth the most distal of which is the longest; propopodite short, with a single lobe on the posterior margin; dactylopodite relatively long. *Peraeopod* 2 (Fig. 1*b*) with the basipodite concave anteriorly, carpopodite considerably longer but scarcely broader than the propopodite. *Peraeopods* 3–7 of the usual *Microdeutopus* form. *Uropod* 3 (Fig. 1*e*) with the rami subequal and longer than the peduncle; exopodite terminal margin with one very long

spine and a group of short spines, inner and outer margins each with a single spine; endopodite inner border with two widely separated spines, the most distal of which is the shorter, outer border with a solitary spine and a single group of short stout terminal spines. *Telson* (Fig. 1*i*) longer than broad, the terminal crests well developed, each bearing on the dorsal surface a short stout spine and distal to it a long seta.

FEMALE PARATYPES (Bahia Honda, Panama): *Peraeopod* 1 with the posterior margin of the carpopodite smoothly rounded and no tooth on the posterior distal angle; otherwise as female *M. schmitti*.

TYPE MATERIAL: 21 ♂ ♂, Station 478–35. 21 ♀ ♀, Station 113–33.

TYPES: ♂ Holotype, USNM No. 112797
2 ♂ ♂ Paratypes, BM No. 1967:7:2:1–2
18 ♂ ♂ Paratypes, USNM No. 112798
2 ♀ ♀ Paratypes, BM No. 1967:7:2:3–4
19 ♀ ♀ Paratypes, USNM No. 112799

DISTRIBUTION: Costa Rica (Salinas Bay), Panama (Bahia Honda), Ecuador (Salango Island) and Galapagos (Isabela Island).

Microdeutopus trichopus sp. nov.

Figs. 2*a–g* and 6*b*

IDENTIFICATION: In the development of teeth on the posterior margin of the carpopodite and propopodite of the first male peraeopod, this form resembles *Microdeutopus tridens* Schell. and *M. kraemmeri* Reid. These two species, however, have the carpopodite short and as slender as the propopodite and should more correctly be attributed to the genus *Lembopsis* Pearse (see also Barnard, 1959). Present material has the carpopodite more bulky than the propopodite, a feature characteristic of *Microdeutopus* Costa, and, since the specimens agree with no known *Microdeutopus* sp., they are designated as *M. trichopus* sp. nov.

TABLE 2
COLLECTIONS

STATION	SPECIES	FORMS COLLECTED		
113–33	*M. hancocki* sp. nov.	12 ♂	21 ♀	4 immature
	N. roosevelti Shoemaker		1 ♀	
114–33	*N. roosevelti* Shoemaker	30 ♂	36 ♀	4 immature
116–33	*A. heteruropus* Barnard	1 ♂		
125–33	*N. roosevelti* Shoemaker	1 ♂		
185–34	*M. trichopus* sp. nov.	3 ♂	1 ♀	
187–34	*M. hancocki* sp. nov.	21 ♂	23 ♀	4 immature
190–34	*M. trichopus* sp. nov.	35 ♂	2 ♀	
204–34	*N. roosevelti* Shoemaker	1 ♂	2 ♀	
257–34	*M. schmitti* Shoemaker	1 ♂		
398–35	*M. hancocki* sp. nov.	1 ♂		
460–35	*M. schmitti* Shoemaker	2 ♂		
	A. heteruropus Barnard	8 ♂	19 ♀	
	N. roosevelti Shoemaker	2 ♂	1 ♀	
461–35	*M. schmitti* Shoemaker	1 ♂		
475–35	*A. oculatus* Barnard	2 ♂		
476–35	*A. oculatus* Barnard	2 ♂	1 ♀	
	M. schmitti Shoemaker	2 ♂	3 ♀	
477–35	*M. schmitti* Shoemaker	20 ♂	43 ♀	12 immature
478–35	*M. schmitti* Shoemaker	309 ♂	465 ♀	
	M. hancocki sp. nov.	21 ♂		
479–35	*M. schmitti* Shoemaker	4 ♂	8 ♀	1 immature
480–35	*M. schmitti* Shoemaker	6 ♂	4 ♀	
481–35	*M. schmitti* Shoemaker	173 ♂	203 ♀	37 immature
	A. oculatus Barnard	1 ♂		
	N. roosevelti Shoemaker	2 ♂		
564–36	*A. oculatus* Barnard	1 ♂		

Formal Description

TYPE LOCALITY: East of south end of Isabela Island, Galapagos.

MALE HOLOTYPE: *Head* (Fig. 6*b*) lobes moderately produced and obtuse, eyes round. *Body* delicate, length from anterior margin of cephalosome to tip of telson 3.8 mm (paratypes 3.0–3.8 mm). Peraeon segments 3–6 (Fig. 2*f*) each with a very long, slender spine on its ventral surface, those of segments 3 and 4 curved forward, and those of segments 5 and 6 slightly recurved. *Antennules* slightly over half the body length, the first peduncular segment slightly shorter than the second, the third about ⅓ the length of the second; flagellum slightly longer than the peduncle, 12-segmented on one side, 11-segmented on the other (paratypes with a maximum of 13 segments); accessory flagellum 3-segmented, the third segment rudimentary. *Antenna* about ⅔ the length of the antennule, the fourth and fifth peduncular segments subequal; flagellum 4-segmented on one side, 5-segmented on the other. *Peraeopod* 1 (Fig. 2*a*) with the coxopodite produced anteriorly, rounded; basipodite expanded anteroproximally; meropodite short; carpopodite oval, longer than broad, with a median dentiform process on the anterior margin, and at the posterior distal angle, a short stout tooth, basal to which, on the posterior margin, is another small tooth. Propopodite over half the length of the carpopodite, the palmar angle produced into a forward projecting, blunt tooth, opposable with the dactylopodite, which is of moderate length and has accessory teeth on the distal part of the inner margin. The posterior margins of the meropodite, carpopodite, and propopodite densely setose, the setae exceptionally long, being about 0.5 mm, 0.4 mm, and 0.3 mm on each podomere respectively. *Peraeopod* 2 (Fig. 2*e*) with the basipodite moderately expanded, the anterior margin slightly concave; carpopodite and propopodite subequal in length and

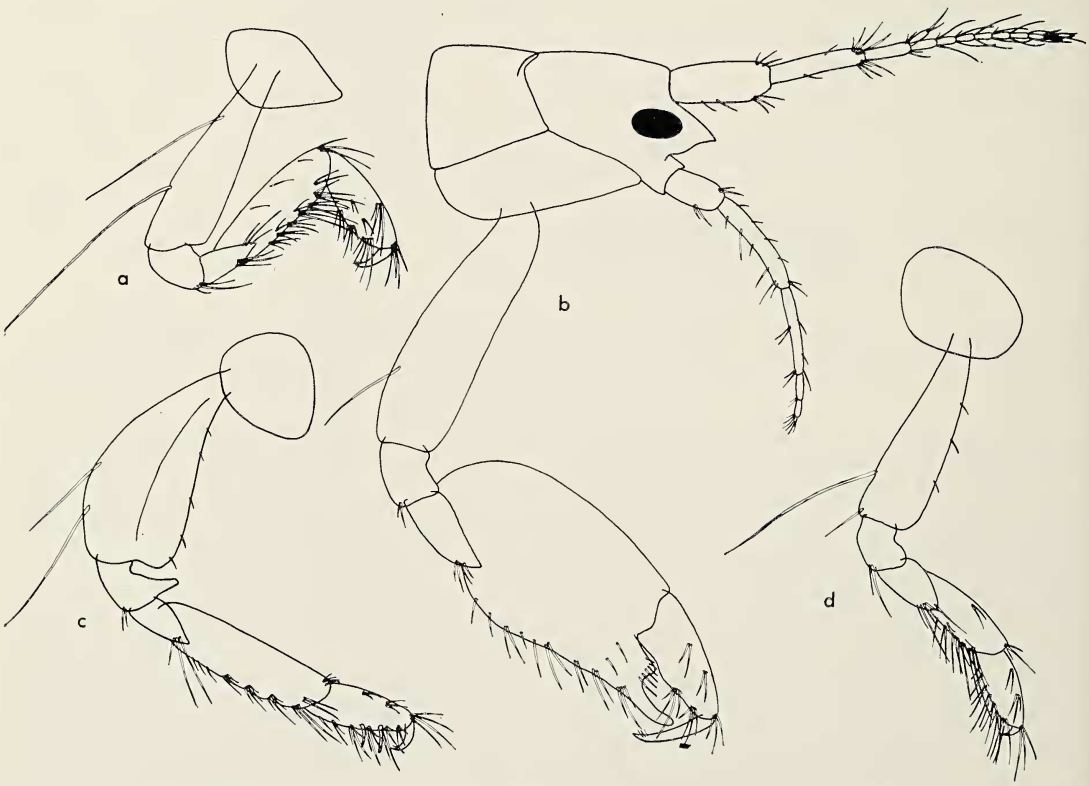

FIG. 3. *Acuminodeutopus heteruropus* Barnard. PLAYA BLANCA, COSTA RICA. ♂: *b*, head and peraeopod 1; *c*, peraeopod 2. ♀: *a*, peraeopod 1; *d*, peraeopod 2.

breadth. *Peraeopods* 3–7 of the usual *Microdeutopus* structure. *Uropod* 3 (Fig. 2*d*) rami long and slender, longer than the peduncle; exopodite very slightly exceeding the length of the endopodite, with a single median spine on the outer margin and a similar one on the inner margin; endopodite with a single spine on the outer margin, and a similar, more distal spine on the inner margin. *Telson* (Fig. 2*b*) broader than long, the terminal crests well developed, each bearing on its dorsal surface a long seta and a short stout spine.

FEMALE PARATYPES: Body lengths 4.0 mm and 3.1 mm. Characters as for male, except for the structure of the first and second peraeopoda. *Peraeopod* 1 (Fig. 2*c*) with the basipodite moderately broad; carpopodite and propopodite slender, subequal in length, the propopodite somewhat broader distally than at the junction with the carpopodite; dactylopodite longer than the palmar region of the propopodite, with accessory teeth on the posterior margin. *Peraeopod* 2 (Fig. 2*g*) with the basipodite moderately broad, carpopodite not greatly expanded distally, slightly shorter than the propopodite; dactylopodite short and stout.

TYPE MATERIAL: 35 ♂ ♂, 2 ♀ ♀, Station 190-34.

TYPES:
- ♂ Holotype, USNM No. 112800
- 2 ♂ ♂ Paratypes, BM No. 1967:7:2:5–6
- 32 ♂ ♂ Paratypes, USNM No. 112802
- 2 ♀ ♀ Paratypes, USNM No. 112801

DISTRIBUTION: Galapagos (type locality and Cartago Bay, Isabela Island).

Acuminodeutopus heteruropus Barnard

Barnard, J. L. 1959. Contr. Allan Hancock Fdn. Occas. Paper 21, pp. 29–30, pl. 7. Figs. 3*a–d*, 4*a–e*

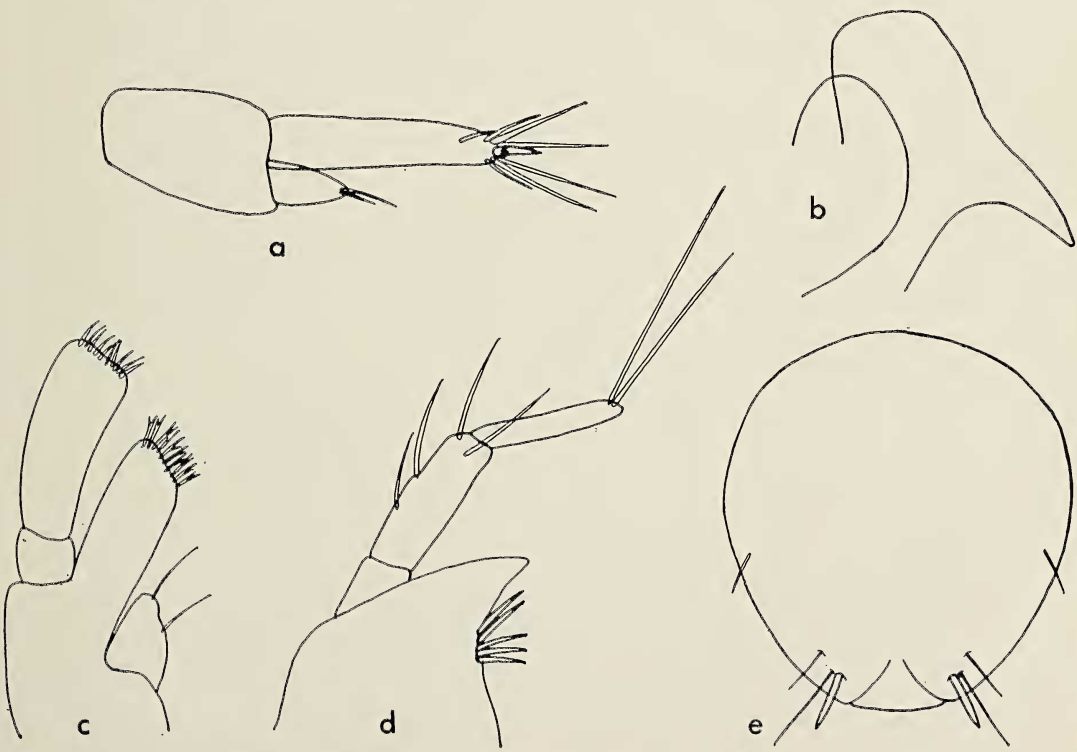

FIG. 4. *Acuminodeutopus heteruropus* Barnard. PLAYA BLANCA, COSTA RICA. ♂: *a*, uropod 3; *b*, paragnath; *c*, maxillule; *d*, mandible; *e*, telson.

IDENTIFICATION: Specimens agree well with the description of Barnard (1959), showing only a few minor points of difference. Unlike type material, the carpopodite of the first male peraeopod has the posterior distal angle produced into a broad process which constricts about halfway along its length into a narrow, blunt-ending, inward curved tooth, which does not reach to the tip of the propopodite, and in this respect resembles specimens collected in the open sea off Newport, California (Barnard, 1961*a*). In addition, the carpopodite of the second male peraeopod is somewhat more elongated than in type material, the propopodite of the first female peraeopod is scarcely expanded distally, and the telson in both sexes bears both spines and setae on its distal margin. The maximum size of males in the collections is 3.0 mm, that of the females, 3.5 mm.

DISTRIBUTION: Present material comes from Costa Rica (Playa Blanca and Cocos Bay), that of Barnard (1959, 1961*a*) from Newport Bay, California.

Amphideutopus oculatus Barnard

Barnard, J. L. 1959. Contr. Allan Hancock Fdn. Occas. Paper 21, pp. 34–35, pl. 10. Fig. 5*d–e*

IDENTIFICATION: Specimens do not differ to any great extent from those described by Barnard (1959). The maximum size of males in the collections is 8 mm, as compared with 4.5 mm for the male holotype.

DISTRIBUTION: Present material came from the Gulf of California (Tiburon Island) and Costa Rica (Salinas Bay), that of Barnard (1959) from Newport Bay.

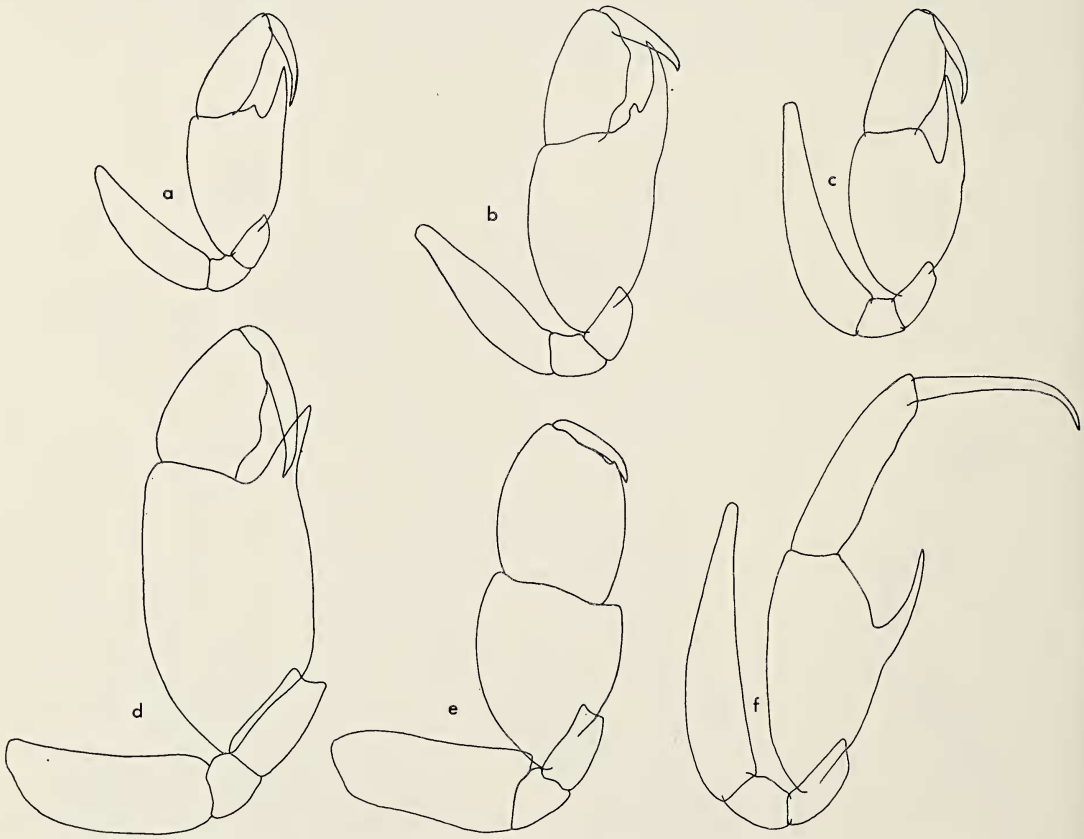

FIG. 5. *Neomegamphopus roosevelti* Shoemaker. BAHIA HONDA, PANAMA. ♂: *a–c, f,* peraeopod 1. *Amphideutopus oculatus* Barnard. TIBURON ISLAND, CALIFORNIA. ♂: *d,* peraeopod 1. SALINAS BAY, COSTA RICA. ♂: *e,* peraeopod 2.

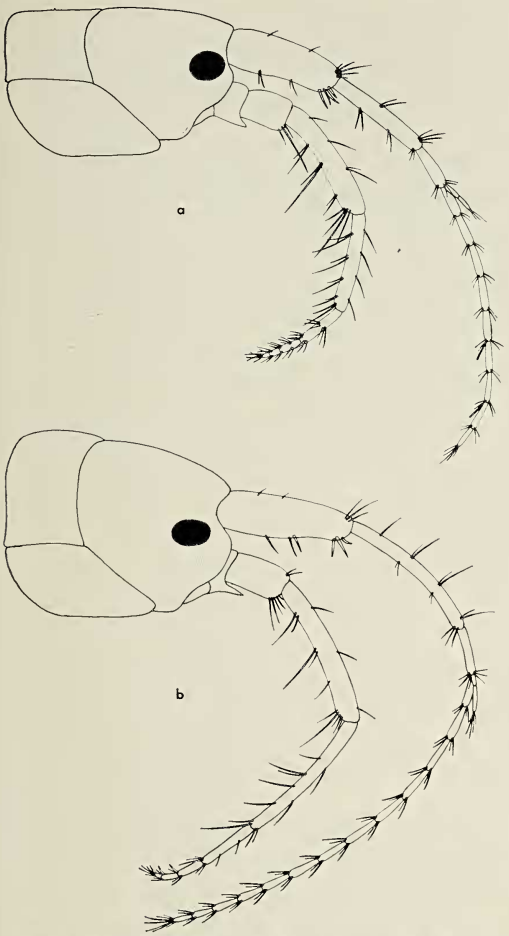

Fig. 6. *Microdeutopus hancocki* sp. nov. SALINAS BAY, COSTA RICA. ♂ Paratype: *a,* head.
Microdeutopus trichopus sp. nov. ISABELA ISLAND, GALAPAGOS. ♂ Paratype: *b,* head.

Neomegamphopus roosevelti Shoemaker

Shoemaker, C. R. 1942. Smithson. Misc. Coll. 101 (11):36–38, fig. 13.
Myers, A. A. 1968. Crustaceana 14(2):127–130.

Fig. 5*a–c, f*

IDENTIFICATION: Specimens agree well with Shoemaker's (1942) description, but the first male peraeopod (Fig. 5*a–c, f*) exhibits great plasticity of form, with the carpopodite tooth arising distally or, as in some very large specimens, from midway along the posterior margin. Intermediates occur according to size, suggesting that in some, but not all, specimens the relative position of the tooth varies according to the stage of development of the animal. The propopodite also varies; in some specimens it is broad with the posterior margin convex, in others it is narrow with the posterior margin concave.

DISTRIBUTION: *N. roosevelti* is in this study shown to be widely distributed along the Pacific coasts of the Americas, in Mexico (Isabel Island), Costa Rica (Playa Blanca and Salinas Bay), Panama (Bahia Honda), and Galapagos (Espanola). The species reaches its most northerly point of distribution in the Pacific in the type locality (Magdalena Bay, Baja California) (Shoemaker, 1942). It is also known from the Atlantic, off the coasts of Venezuela (Myers, 1968) and Florida (unpublished observations).

DISCUSSION

All five genera recorded are here included in the family Aoridae, even though it is difficult to separate this family from the Photidae (Barnard, 1959). The genera *Amphideutopus* and *Neomegamphopus* are particularly difficult to allocate since they show relationships with the Photidae in the form of the head and mandible, but have the gnathopod and paragnath characteristic of the Aoridae. Following Barnard (1962) who included *Neomegamphopus* in the Aoridae, *Amphideutopus* is here also regarded as a member of that family since for practical purposes the enlarged first gnathopoda may be taken as the common feature which unites these genera within the Aoridae. Barnard has suggested that this feature probably indicates some basic difference in axial gradients between the two groups.

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